A Compact Coronagraph Design for Heliophysics Missions

Completed Technology Project (2012 - 2015)

Project Introduction

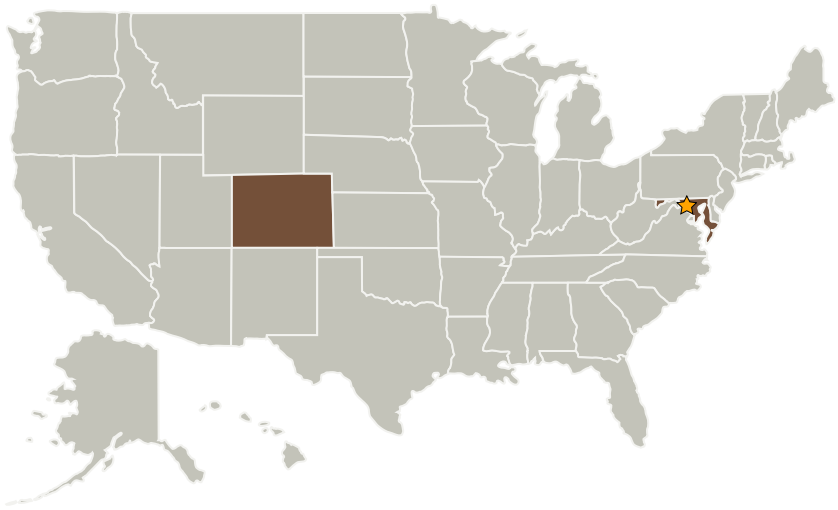
A compact coronagraph design will greatly reduce the mass, volume, and cost of coronagraphs. This project will develop a compact coronagraph design for Heliophysics missions and test and evaluate the design.

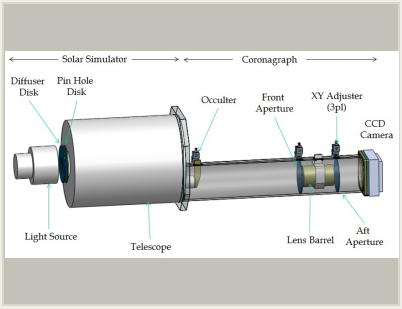
Coronagraphs need to block the photospheric light of the Sun, so the corona (about a million times dimmer than the photosphere) can be imaged. Blocking the photospheric light is possible by an external occulting disk (occulter) in front of the objective lens of the solar telescope. An internal occulter, after the objective elements and other stops are positioned and sized, is used to reject light from the solar disk. One of the constant problems in coronagraphs is the photospheric light diffracted by the external occulter that enters into the coronagraph system due to scattering by the optical elements. Thus a successful rejection of the diffracted light is one of the key aspects of any coronagraph system. By suitably designing the occulters and stops the intensity of diffracted and scattered light needs to be reduced.

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Orbital Sciences Corporation	Supporting Organization	Industry	
The Catholic University of America(CUA)	Supporting Organization	Academia	Washington, District of Columbia

Co-Funding Partners	Type	Location
National Center for Atmospheric Research(NCAR)	R&D Center	Boulder, Colorado

Primary U.S. Work Locations	
Colorado	Maryland

Project Transitions

October 2012: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

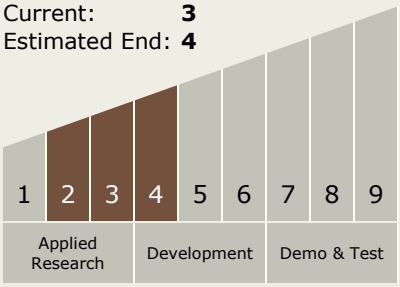
Nikolaos Paschalidis

Principal Investigator:

Natchimuthuk Gopalswamy

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **4**



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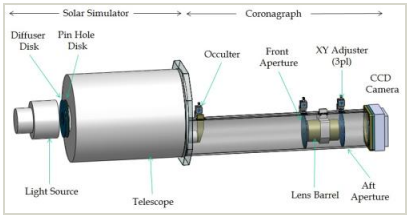
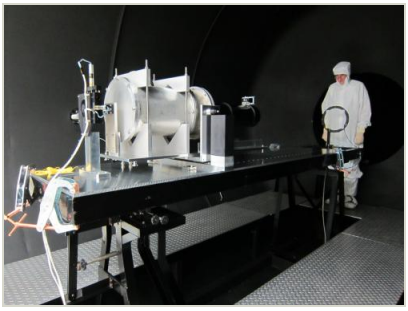
September 2015: Closed out

Closeout Summary: The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services. Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry. The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies. If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. http://techport.nasa.gov/help

Images



11915-1364437357223.jpg
A Compact Coronagraph Design for Heliophysics Missions
(https://techport.nasa.gov/image/36880)



Compact coronagraph inside NVTF
The compact coronagraph as mounted on an optical bench inside the NCAR Vacumm Tunnel Facility (NVTF) ready to be tested for diffraction-rejection capability. The vacuum tunnel provides an environment similar to space.
(https://techport.nasa.gov/image/36882)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

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Stories

End of Year Reoprt FY14
(https://techport.nasa.gov/file/51714)

FY13_EOY_report
(https://techport.nasa.gov/file/51713)

Links

NTR 1438100488
(no url provided)

Project Website:

http://sciences.gsfc.nasa.gov/sed/